

SEMICONDUCTOR MEMORY DEVICE

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Abstract

PURPOSE: To enable to significantly augment the capacity of the capacitor by a method wherein a thick insulating film is provided on the upper part of the transfer transistor and the cylindrical capacitor, which penetrates the insulating film and comes into contact with the impurity diffusion region to be used as the storage node of the transistor.

CONSTITUTION: A transfer transistor Tr is formed on a P-type silicon substrate 1, and after that, an SiO₂ insulating film 21 is formed on the substrate 1 by a CVD method. Then, a first through hole 22 to enable an N<+>-type region 9, which is used as the storage node of the transistor Tr, to expose and a second through hole 23 to enable an N<+>-type drain region 8 to expose are formed by an RIE method. Then, a polycrystalline Si layer PB in a thickness so thick as to fill the second through hole 23 is formed. Then, an etching is performed on the whole surface by an RIE method, the surface of the N<+>-type region 9 is made to expose and an SiO₂ dielectric film 26 is formed on the surface of the layer PB and on the exposed surface of the N<+>-type region 9 by a thermal oxidation method. The layer PB in the first through hole 22 is turned into a cylindrical capacitor electrode 24 for charge storage and the layer PB in the second through hole 23 is turned into a drain electrode 25.

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